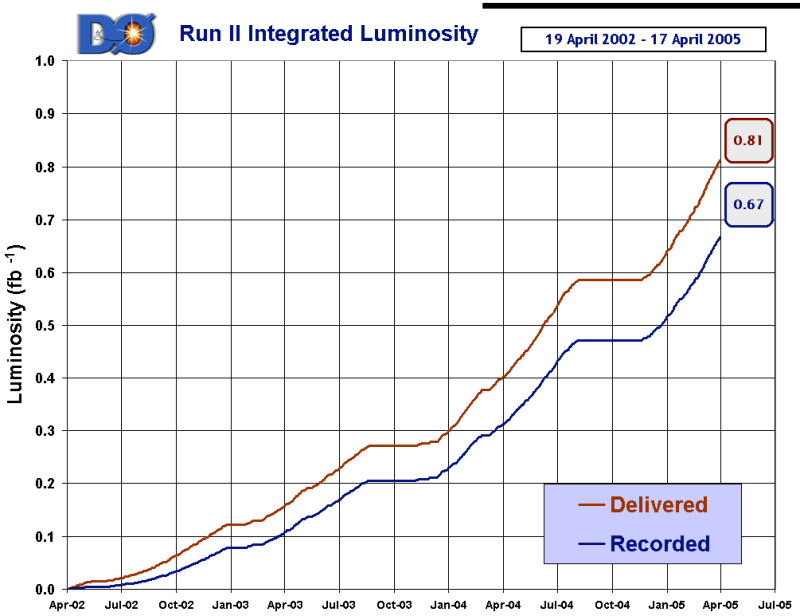
DØ Status Report

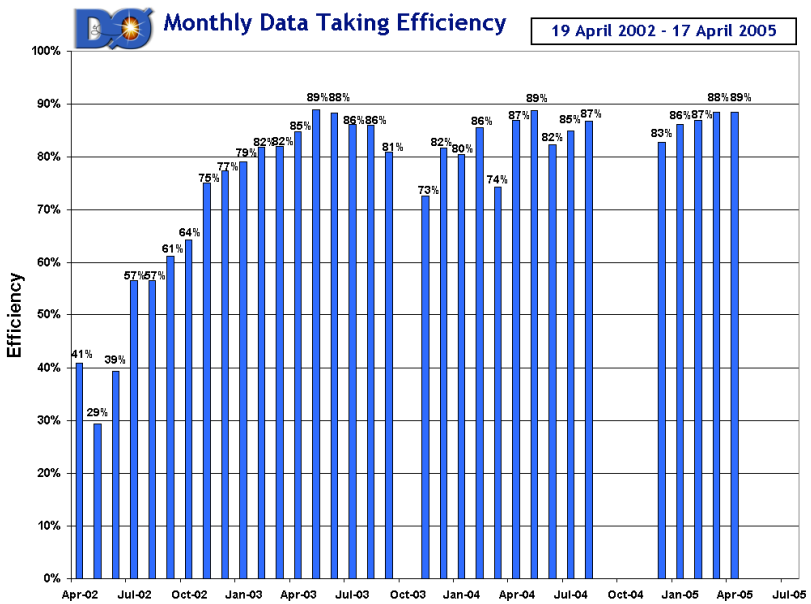
DØ International Finance Committee
21st April 2005

Terry Wyatt. University of Manchester

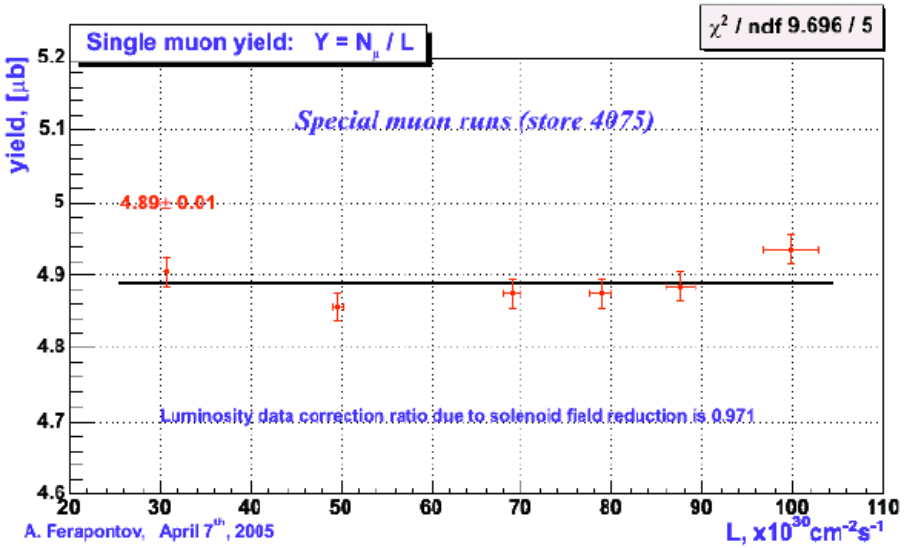
- Detector operations
- Event reconstruction
- Physics results
- Run 2b upgrades
- Effort reporting
- Summary of DØ goals for next 12 months

Detector Operations



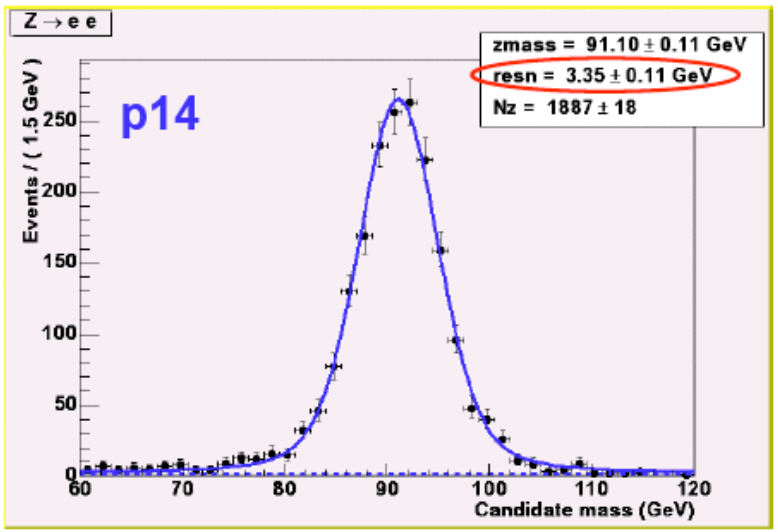


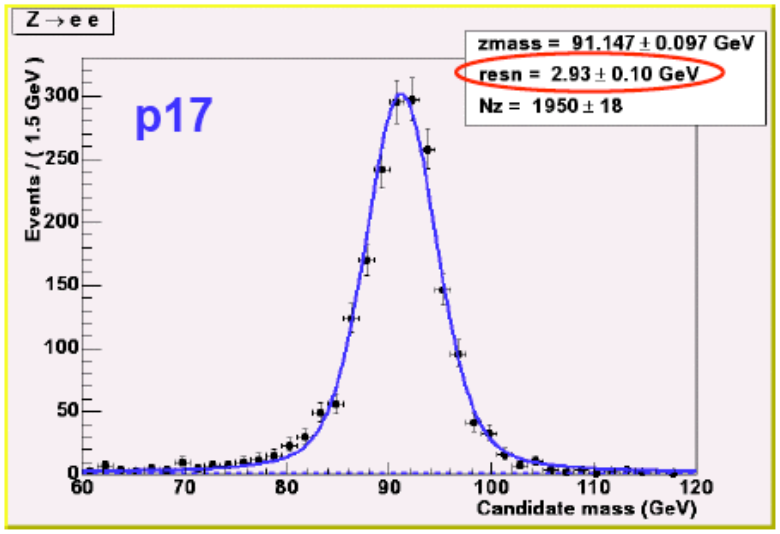
- Solenoid: stable operation at reduced field
  - hope to avoid <u>any</u> further thermal cycles
  - reduce number of power cycles
    - working towards leaving solenoid on during access
- Rate limits and prescales at high luminosities
  - we nearly have “v14” trigger list
- Improved deadtime correction in DØ luminosity measurement
  - Measurement of forward muon “cross-section” indicates linearity to ~1% level
- Continual vigilance and a lot of manpower needed to maintain high efficiency and quality of data taking!
- See talk by Linda Stutte for more details



Event Reconstruction

- "p17" reconstruction code brings many benefits:
  - speed
  - preshower, muons, etc.
  - EM calibration
    - constants from database, intercalibration using collider data





- p17 re-processing now running at Fermilab and remote sites
  - ~10^9 events, ~0.5 PB data, ~3.5 THz CPU continuously for six months!
- See talks by Amber Boehnlein and Gavin Davies for more details

Improving Performance

- Speed and performance of tracking
- Understand and correct for dead material
  - tracking and calorimetry
- Hadron calorimeter calibrations
  - data collection completed
- Jets: energy scale and use of tracking
- Automated data quality and object ID certification
- Accuracy of Monte Carlo detector simulation

Physics Results

- Since last DØ IFC (21st Oct 2004) the number of submitted run 2 physics papers has increased from 6 to 20:
  - *Measurement of the Lambda-B Lifetime*
  - *Measurement of the Ratio of B^+ and B^0 Meson Lifetimes*
  - *Measurement of inclusive differential cross sections for Upsilon(1S) production*
  - *First measurement of $\sigma \bullet Br(Z \to \tau^+\tau^-)$*
  - *Measurement of the WW Production Cross Section*
  - *Study of $Z\gamma$ events and limits on anomalous couplings*
  - *Measurement of the $W\gamma$ Cross section and Limits on Anomalous Couplings*
  - *Production of WZ events and limits on anomalous couplings*
  - *Measurement of the Ratio of Inclusive Cross Sections for Zb and Zq*
  - *Search for Wbb and WH Production*
  - *Search for anomalous heavy-flavor quark production in association with W bosons*
  - *Search for neutral supersymmetric Higgs bosons in multijet events*
  - *Search for first-generation scalar leptoquarks*
  - *Search for SUSY in trilepton events*

Physics Results

In addition:

- A further 4 papers are in final stages of collaboration review
- A further 23 new preliminary DØ results were approved for the 2005 winter conferences in the following areas:
  - 3 Electroweak
  - 3 Top
  - 2 Higgs Searches
  - 6 New Phenomena Searches
  - 2 QCD
  - 7 B physics
    - using $\int L$ of up to 530 pb^{-1}
- Run 2 DØ NIM paper is close to submission

- See http://www-d0.fnal.gov/Run2Physics/WWW/results.htm for details

Run 2b Upgrade

Making very substantial progress:

- L1Cal:
  - board manufacture complete
  - integration testing underway
- L1CTT:
  - prototype boards being operated parasitically as part of standard data taking
    - shown to give consistent results with old hardware
- Silicon Layer-0:
  - module assembly complete
  - detector assembly about to start
  - installation tooling being designed
- Successful “Director’s” review in February 2005
  - DØ encouraged to spend financial contingency to gain schedule contingency
    - already some progress here!
- Very detailed planning for installation and physics commissioning underway (SCIPC)
- AFE-IIt (readout for fibre tracker):
  - internal DØ committee in Jan 2005
    - recommendation to go ahead accepted by spokes
  - director’s review on April 13th 2005
    - positive wrt physics motivation and technical solution
    - some concerns wrt project management and schedule
- See talk by Vivian O’Dell for more details

Reported FTE Effort on DØ for 2004

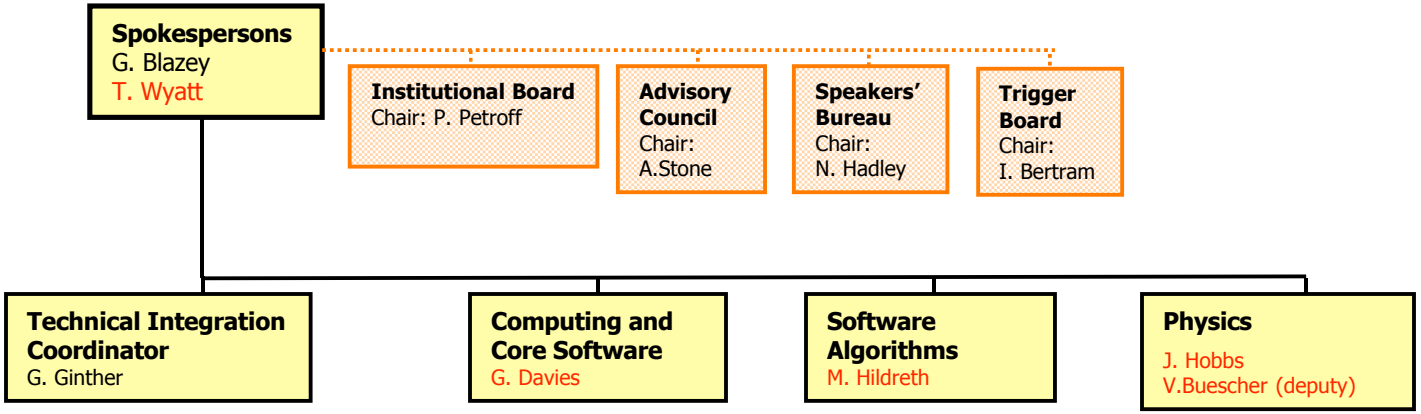
- Reported by Institutional Board representatives
- Corresponds to 594 individuals from all but one of DØ's institutes

Category	FTE
Operations	80
Shifts	31
Computing	27
Algorithms and object ID	77
Physics	150
Student supervision	24
Upgrade	22
Misc. management	29
Total	440

Next Steps wrt. Effort Reports

- We have recently made the complete effort reports available to the entire collaboration
  - Some inaccuracies being fixed by individuals and Institutional Board reps
  - Follow up with conveners whether or not reported effort corresponds to their perception of reality
- Use currently reported effort as starting point for discussion of next MoU
  - (to come into effect this autumn)

Collaboration Management from Summer 2005



- reflects the international nature of the collaboration

DØ Goals for 2005

Month	Run 2a	Run 2b
Mar	p17 reprocessing starts at Fermilab	
Apr	p17 reprocessing starts offsite p17 Monte Carlo certified	
May	v14 trigger list online	Upgrade integrated into TrigSim
June	Preliminary ID certification for 2005 data (e,μ,γ,jet,MET)	Straw-man run 2b trigger list
July	Release p17 with HCAL calibrations and improved treatment of dead material Fixing/skimming as a central production activity	
Aug		L1Cal and L1CTT systems assembled Layer-0 detector assembled
Sept		First full run2b trigger menu and associated trigger DB infrastructure
Oct		Shutdown begins (provisional date)
Nov	p17 reprocessing complete (Run 2a ~800pb^{-1} p17 dataset) Final ID certification (e,μ,γ,jet,MET)	
Dec	Final certification of p17 Jet Energy Scale	

In summary:
Success and a huge challenge!

- In the next 12 months we have to:
  - continue to operate detector with high efficiency and quality
  - continue to improve detector understanding and quality of reconstruction code and simulation
  - reprocess and recertify entire Run 2a data sample
  - maintain rate of physics publications
  - build/install/commission tracking+trigger upgrades
  - plan for the longer term (LHC startup)
- We have to succeed in ALL of these areas!!!
  - Make effective use of available resources
  - Motivate people to work (and continue to work) on DØ:
    - Set challenging but achievable goals
    - Have the right people in the right places at the right time
  - We hope our continuing success will motivate you to continue to support/fund your DØ groups!